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IS 13886 (1993): Bimetallic thermostats and thermal cutouts for use with electric irons [ETD 32: Electrical Appliances]

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Indian Standard

SPECIFICATION FOR BIMETALLIC THERMOSTATS AND THERMAL CUTOUTS FOR USE WITH ELECTRIC IRON

UDC 536·581 : 648·424

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BUREAU OF INDIAN STANDARDS
MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG
NEW DELHI 110002

October 1993

Price Group 3

Electrical Appliances Sectional Committee, ET 32

FOREWORD

This Indian Standard was adopted by the Bureau of Indian Standards, after the draft finalized by the Electrical Appliances Sectional Committee had been approved by the Electrotechnical Division Council.

This standard is intended to provide guidance to the manufacturers of the thermostat and the appliances about the range and acceptance norms, to provide safety to the user against shock and fire hazards, etc, and to offer a reasonable life of the appliance to the consumer.

This Indian Standards covers Bimetallic Thermostat & Thermal cutout for use in electrical heating appliances such as Domestic Irons.

This standard is to be read in conjuction with IS 302-1 (1979). For the sake of convenience, the clauses of this standard correspond to those of IS 302-1 (1979) 'Safety Requirements for Household and Similar Electrical Appliances: Part 1 General Requirements'. Instead of reproducing full text of each clause, clauses of IS 302-1 (1979) which are applicable (which means that relevant provisions of the clause apply) or not applicable and the sub-clauses or portions thereof which are not applicable are indicated as under:

a) In case of a clause where it is applicable or not applicable, the wordings used is "This clause of IS 302-1 (1979) is applicable/not applicable".

b) In case of a sub-clause or part thereof 'Not applicable'.
Wherever a sub-clause of IS 302-1 (1979) is to be replaced by a new text, it has been indicated as under:

'Replacement — followed by the new text.'
Any addition to the existing provisions of a sub-clause of IS 302-1 (1979) has been indicated as under:

'Addition — followed by the text of the additional matter.'
Clauses/tables which are additional to those of IS 302 : 1979 are numbered starting from 101 and additional sub-clauses are numbered with the main clauses number followed by 101, 102, etc.

While preparing this standard, assistance has been derived from the following:

IEC Publication 335-1 (1976) 'Safety of household and similar electrical appliances, Part 1 General requirements'. International Electrotechnical Commission.

IEC Publication 730 (1982) 'Automatic controls for electrical household appliances'. International Electrotechnical Commission.

BS 3855 Part 3 : 1979 'Specification for electrical controls for household and similar general purposes, Part 3 General and specific requirements'. British Standards Institution.

For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated, expressing the result of a test or analysis, shall be rounded off in accordance with IS 2 : 1960 'Rules for rounding off numerical values (*revised*)'. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

Indian Standard

SPECIFICATION FOR BIMETALLIC THERMOSTATS AND THERMAL CUTOUTS FOR USE WITH ELECTRIC IRON

1 SCOPE

1.1 This standard covers the general, safety and performance requirements of thermostats and thermal cutout of the bimetallic type for use with electric irons intended for use on ac circuits at voltages not exceeding 250 V and current rating not exceeding 10 Amps.

2 TERMINOLOGY

This clause of IS 302-1 (1979) is applicable except as follows:

2.4, **2.6** to **2.11**, **2.16** to **2.22**, **2.26** to **2.34**, **2.46** and **2.47** not applicable.

Additional sub-clauses

2.101 Bimetallic Thermostat

A thermostat of which the thermally responsive member consists of bimetallic components (strip, disc, etc).

2.102 Adjustable Thermostat

Thermostat whose operating temperature can be adjusted after installation by means of a knob or pointer moving relative to a graduated scale and without removing the thermostat.

2.103 Non Adjustable Thermostat

A thermostat which has no external means for changing its operating temperature.

2.104 Switch Head

That portion of the thermostat/thermal cutout which contains the switch and operating machanism.

2.105 Operating Temperature

The temperature at which the thermostat contacts open under the specified conditions of test.

2.106 Differential

A difference between the temperature at which the contacts open and the temperature at which they close under the specified conditions of test.

2.107 Indicated Temperature

This temperature indicated by the knob or pointer on the scale of an appliance fitted with an adjustable or pre-set thermostat of the thermostat temperature marked on a non-adjustable thermostat.

2.108 Type 1 Action

It denotes an automatic action for which the manufacturing deviation and the drift of its operating value, operating time or operating sequence have not been declared and tested under this standard.

2.109 Type 2 Action

It denotes an automatic action for which the manufacturing deviation and drift of its operating value, operating time and operating sequence have been declared and tested under this standard.

2.110 Manufacturing Deviation

It denotes the maximum difference of operating value, operating time or operating sequence which is claimed between only two controls, supplied by the manufacturer to a unique type reference, when tested as submitted and in the same manner.

2.111 Drift

It denotes the maximum alternation of operating value, operating time or operating sequence of any one sample which can occur when it is tested under the conditions specified in the standard.

3 GENERAL REQUIREMENT

This clause of IS 302-1 (1979) is applicable except as follows:

3.1 Para 2 not applicable.

4 GENERAL NOTES ON TESTS

4.1 This clause of IS 302-1 (1979) is applicable except **4.2,** Note 3 to 5 not applicable. **4.7** to **4.17** not applicable.

5 RATING

This clause of IS 302-1 (1979) is applicable except as follows:

5.1 Replacement

The rated voltage shall not exceed 250 V.

The preferred voltage shall be 240 V.

5.2 Replacement

The current rating shall not exceed 10 Amps.

6 CLASSIFICATION

This clause of IS 302-1 (1979) is applicable except as follows:

6.1 (a) (2) and **6.1** (a) (3) not applicable,

6.1 (b) not applicable.

6.2 According to their Purpose

a) Thermostat

b) Temperature limits

c) Thermal cut out

6.3 According to Nature of Supply

a) ac only

b) ac or dc only

c) dc only

6.4 According to Features of Automatic Action

a) Type 1 action

b) Type 2 action

6.5 According to Method of Connection

Controls with at least one terminal intended for the connection of a flexible cord.

6.6 According to Circuit Disconnection or Interruption

Full disconnection.

Addition

NOTE 4 — Ordinary thermostats are not provided with any special protection against moisture.

NOTE 5 — For the purpose of this standard, unenclosed, thermostats are considered to be ordinary thermostats. It is, however, understood that a higher degree of protection against moisture may be obtained when the thermostat is mounted in the appliance.

7 MARKING

This clause of IS 302-1 (1979) is applicable except as follows:

7.1 Replacement

The following information shall be marked on the outer visible surface of the thermostat/thermal cutout.

a) Name or registered trade-mark of the manufacturer;

b) Rated voltage in volts and current in amperes; and

c) The operating temperature or range of temperature.

NOTE — The information at (c) may be marked on the packing.

7.2, **7.3**, **7.4**, **7.6** to **7.14** are not applicable.

Additional sub-clause

7.101 The thermostats may also be marked with the BIS Certification Mark.

8 PROTECTION AGAINST ELECTRIC SHOCK

This clause of IS 302-1 (1979) is not applicable.

9 STARTING OF MOTOR OPERATED APPLIANCES

This clause of IS 302-1 (1979) is not applicable.

10 INPUT AND CURRENT

This clause of IS 302-1 (1979) is not applicable.

11 TEMPERATURE RISE

11.2 Replacement

The thermostat or thermal cutout is set at its highest setting and is mounted in the electric iron so that the temperature of the Bimetal differs from the temperature set on the thermostat by 5 ± 1°C and the contacts are in the closed position but as near the point of opening as possible.

11.4 to **11.6** not applicable.

11.7 Replacement

The thermostat or thermal cutout is operated at the rated voltage and rated current for a period of 48 hours.

11.8 Replacement

During the temperature rise test, sealing compound, if any, shall not flow out. Compliance is checked by inspection.

The temperature rise for the various parts of electric iron shall not exceed the values given in Table 1 of IS 302-1 (1979).

The values in the table are based on an ambient temperature not normally exceeding 40°C but occasionally reaching 50°C. However, the temperature rise values are based on 40°C.

11.9 and **11.10** not applicable.

12 OPERATION UNDER OVERLOAD CONDITIONS WITH HEATING ELEMENTS

This clause of IS 302-1 (1979) is applicable except as follows:

12.1 Replacement

The thermostat or thermal cutout shall be loaded with 1·25 times rated current at 1·1 times rated voltage and operated for 200 cycles of Make and break at a rate of four cycles per minute. During this test, there shall not be sustained arcing and the contact shall not have deteriorated appreciably.

12.2 and **12.3** not applicable.

13 ELECTRICAL INSULATION AND LEAKAGE CURRENT AT OPERATING TEMPERATURE

This clause of IS 302-1 (1979) is applicable except as follows:

13.1 Replacement

The thermostat or thermal cutout is connected to supply at 1·15 times current and the contacts are closed.

14 RADIO AND TELEVISION INTERFERENCE SUPPRESSION

This clause of IS 302-1 (1979) is not applicable.

15 MOISTURE RESISTANCE

This clause of IS 302-1 (1979) is not applicable except as follows:

15.2.1 to **15.2.4** and **15.3** not applicable.

16 INSULATION RESISTANCE AND ELECTRIC STRENGTH (AFTER HUMIDITY TREATMENT)

This clause of IS 302-1 (1979) is applicable except as follows:

16.1 Replacement

The insulation and electric strength of appliances shall be adequate.

Compliance is checked by tests given in **16.3** and **16.4** which are made on cold thermostat after the test given in **15.4** in the humidity cabinet or in the room in which the sample was brought to the prescribed temperature after reassembly of those parts which may have been removed.

17 OVERLOAD PROTECTION

This clause of IS 302-1 (1979) is not applicable.

18 ENDURANCE

This clause of IS 302 : 1979 is applicable except as follows:

18.2 Endurance Test

The thermostat or thermal cutout shall be subjected by thermal operation to a total of 2 500 consecutive switching cycles, each cycle, consisting of the making and breaking of maximum rated current at a maximum rated voltage and at a frequency of operation of approximately 30 cycles per hour. At the end of the test, the operating temperature and differential shall be determined.

18.2.1 Performance after Endurance Test

a) The operating temperature determined in **18.2** shall not differ from the operating temperature determined before the endurance test by more than 6°C.

b) The operating temperature when determined again with the knob set, for the maximum temperature shall not exceed 260°C.

c) The change in differential shall not exceed 7·5°C.

d) The thermostat shall again satisfy the test for moisture resistance and insulation resistance.

e) The connections and contacts shall not work loose due to heating, vibration, etc.

19 ABNORMAL OPERATION

This clause of IS 302 ; 1979 is not applicable.

20 STABILITY AND MECHANICAL HAZARDS

This clause of IS 302 : 1979 is not applicable.

21 MECHANICAL STRENGTH

Impact Test.

This clause of IS 302 : 1979 is applicable.

22 CONSTRUCTION

This clause of IS 302 : 1979 is applicable except as follows:

22.4, 22.9 to **22.12**, **22.15** to **22.20**, **23.23** to **22.32** not applicable.

Additional Sub-clauses

22.101 Provision for Attaching to Appliances

There shall be provision for attachment to the appliance so that bimetal shall have intimate contact with the heating surface for better operation.

22.102 Range

For adjustable and pre-set thermostats, a scale indicating temperature range over which the temperature ranges may be adjusted, shall be provided. If there is no provision to mark temperature on knob, etc, there shall be mark/ indication of minimum and maximum temperature on the thermostat or thermal cutout.

23 INTERNAL WIRING

This clause of IS 302 : 1979 is not applicable.

24 COMPONENTS

This clause of IS 302 : 1979 is applicable except as follows:

24.2 and **24.4** to **24.10** not applicable.

25 SUPPLY CONNECTIONS AND EXTERNAL FLEXIBLE CABLES AND CORDS

This clause of IS 302 : 1979 is applicable except as follows:

25.3 to **25.10** not applicable.

26 TERMINALS FOR EXTERNAL CONDUCTORS

This clause of IS 302 : 1979 is applicable.

27 PROVISION FOR EARTHING

This clause of IS 302 : 1979 is applicable except as follows:

27.3 not applicable.

28 SCREWS AND CONNECTIONS

This clause of IS 302 : 1979 is applicable.

29 CREEPAGE DISTANCE AND CLEARANCE

This clause of IS 302 : 1979 is applicable.

30 RESISTANCE TO HEAT, FIRE AND TRACKING

This clause of IS 302 : 1979 is applicable.

31 RESISTANCE TO RUSTING

This clause of IS 302 : 1979 is applicable.

32 RADIATION HAZARD

This clause of IS 302 : 1979 is applicable.

33 FINISH

This clause of IS 302 : 1979 is applicable except as follows:

33.1 Replacement

The external finish used on metal components shall be of a heat and moisture resisting nature and shall not be adversely effected by variations in temperature under normal operating conditions or during the endurance test.

33.2 Not applicable.

Additional clauses

101 MOUNTING BRACKET OR MOUNTING ARRANGEMENT

101.1 The mounting bracket or arrangement shall be designed to ensure firm contact with heating surface for better operation.

102 TEST FOR THERMAL CHARACTERISTICS

102.1 Normal Operation

The operating temperature and differential as determined shall be within the limits specified by the manufacturer.

Operating temperature shall not differ by more than 8°C from the indicated temperature, at minimum and maximum setting recommended by the manufacturer.

103 MANUFACTURING DEVIATION AND DRIFT

103.1 Those parts of controls providing a Type 2 action shall have adequate consistency of manufacture with regard to their declared operating value, operating time, or operating sequence.

Compliance is checked by the appropriate tests of this clause.

103.2 For those controls which are completely or partially destroyed during their normal operation, the test **18** are deemed to be sufficient.

103.3 For those controls which are dependent on the method of mounting on, or incorporation in an equipment for their operation the manufacturing deviation and the drift shall be declared separately and be comparative values. The declared manufacturing deviation should be expressed as a bandwidth or spreed (for example, 10°C) and the drift by an alteration of value (for example, ± 10°C or $^{+5}_{-0}$°C).

103.4 The consistency shall be determined as follows:

103.4.1 Test apparatus used shall be such that the control is mounted in the manner declared by the manufacturer.

103.4.2 However, because this test is made to determine comparative values rather than response values, the form of the apparatus is not critical. It should, however, simulate as nearly as is practicable the conditions of service.

103.4.3 The appropriate operating value, operating time or operating sequence shall be recorded for each sample. No two samples shall differ from each other by an amount exceeding the declared manufacturing deviation.

103.4.4 The recorded values are also used as reference values for each sample, so that the repeat tests after the environmental tests of **104** and the endurance test of **18** will enable drift to be determined.

104 ENVIRONMENTAL STRESS

104.1 Controls which are sensitive to the environmental stresses of temperature, pressure of light, shall withstand the level of the appropriate stress likely to occur in transportation and storage.

104.1.1 Compliance is checked by the appropriate tests of **104.2**, **104.3** and **104.4**, carried out with the control being left in the same condition declared as a transportation condition. If no transportation condition is declared the control is tested with an actuating member or actuating means in the most unfavourable position.

104.2 Environmental Stress of Temperature

104.2.1 The effect of temperature is tested as follows:

The entire control shall be maintained at a temperature of — 10 ±2°C for a period of 24 h.

The entire control shall then be maintained at a temperature of 60 ± 5°C for a period of 4 h.

104.2.2 The control is not energized during either test.

104.2.3 After each test a control with an actuating member or actuating means shall be capable of being actuated to provide correctly the class of circuit disconnection declared, in so far as this can be determined without dismantling the control. This test is carried out at normal room temperature.

104.2.4 In addition, for controls with Type 2 actions, the appropriate test of **103** shall be repeated after each of the above tests. The value measured in these tests shall not differ from the value recorded in **103** for the same sample, by an amount greater than the drift declared by the manufacturer.

104.3 Environmental Stress of Light (Under Consideration)

104.4 Environmental Stress of Pressure (Under Consideration)

105 TESTS

105.0 Categories of Tests

Tests are classified as type, routine and acceptance tests.

105.1 Type Tests

The tests specified in Table 101 shall constitute the type tests and shall be carried out on two samples of thermostats of the same type and rating selected preferably at random from a regular production lot. Before commencement of the tests, the thermostats shall be visually examined and inspected for obvious visual defects in respect of components, parts and their assembly, construction, markings, provision of suitable terminals for supply connection, earthing and the effectiveness of screws and connections. The external surface finish shall be even and free from finishing defects.

Table 101 Schedule of Type Tests

Sl No.	Test	Clause Reference
(1)	(2)	(3)
i)	Temperature-rise	11
ii)	Operation under overload conditions	12
iii)	Electrical insulation and leakage current at operating temperature	13
iv)	Moisure resistance	15
v)	Insulation resistance and electric strength (after humidity treatment)	16
vi)	Endurance	18
vii)	Mechanical strength	21
viii)	Construction	22
ix)	Components	24
x)	Supply connections and external flexible cables and cords	25
xi)	Terminals for external conductors	26
xii)	Earthing connection	27
xiii)	Screws and connections	28

Table 101 (*Concluded*)

xiv)	Creepage distances and clearances	29
xv)	Resistance to heat, fire and tracking	30
xvi)	Resistance to rusting	31
xvii)	Finish	33
xviii)	Mounting bracket or mounting arrangement	101
xix)	Test for thermal characteristics	102
xx)	Manufacturing deviation and drift	103
xxi)	Environmental stress	104

105.1.1 Criteria of Acceptance

Both samples shall successfully pass all the type tests for proving conformity with the requirements of the standard. If any of the samples fails in any of the type tests, the testing authority, at its discretion may call for fresh samples not exceeding twice the original number and subject them again to all tests or to the tests in which failure(s) occurred. No failure shall be permitted in the repeat test.

105.2 Acceptance Tests

The following shall constitute the acceptance tests:

Test	*Clause Reference*
a) Temperature-rise	11
b) Electrical insulation and leakage current at operating temperature	13
c) Moisture resistance	15
d) Insulation resistance and electric strength after humidity treatment	16
e) Earthing connection	27
f) Mounting bracket or mounting arrangement	101
g) Test for thermal characteristics	102

NOTE — For the purpose of the acceptance of the acceptance tests, the conditioning shall be done for 24 hours while carrying out the moisture resistance test.

105.2.1 A recommended sampling procedure for acceptance test is given in Appendix B of IS 302-1 (1979).

105.3 Routine Tests

The following tests shall constitute the routine tests:

Test	*Clause References*
High voltage	**13.3.2** of IS 302-1 (1979)

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Doc : No. ETD 32 (3302)

Amendments Issued Since Publication

Amend No.	Date of Issue	Text Affected

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Printed at New India Printing Press, Khurja, India